

REMARKS

In the Office Action, the Examiner rejected claim 1-46 under 35 USC 102 and 103. These rejections are fully traversed below.

Claims 1, 25, 41, 44 and 45 have been amended. Claims 1 and 25 were amended to further define transmitted light. Claim 41 was amended to include the limitations of dependent claims 42, 43 and 46. Claims 44 and 45 was amended to correct its dependency. Claims 42, 43 and 46 have been cancelled. Thus, claims 1-41 and 44-45 are pending in the application. Reconsideration of the application is respectfully requested based on the following remarks.

SPECIFICATION & ISSUES UNDER 35 USC 132

The amendment filed 1/17/02 has been objected to under 35 U.S.C 132 because it introduces new matter into the disclosure.

Claims 25-28 and 37 have been rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

The undersigned respectfully disagrees with the examiners assertion that “the optical inspection system is configured to perform simultaneous transmitted and reflected light inspection where the amount of light transmitted through the substrate and the amount of light reflected from the substrate is measured via the light detector arrangement” is not supported by the original disclosure.

Fig. 1 of the present application shows a light arrangement 32 that is arranged for sensing the light intensity of either the reflected light and/or transmitted light at the same time (simultaneously). The original disclosure states on pages 8 and 9 (lines 30-11), “Furthermore, the second optical arrangement 24 includes at least a second set of optical elements 30 and a light detecting arrangement 32. The second set of optical elements 30 are in the path of a

plurality of collected light beams 40, which are formed after the plurality of incident light beams 36 intersect with the surface 11 of the substrate 12. The plurality of collected light beams 40 may result from transmitted light that passes through the substrate 12 and/or reflected light that is reflected off the surface 11 of the substrate 12. The second set of optical elements 30 are adapted for collecting the plurality of collected light beams 40 and for focusing the collected light beams 40 on the light detecting arrangement 32. The light detecting arrangement 32 is arranged for detecting the light intensity of the collected light beams 40, and more particularly for detecting changes in the intensity of light caused by the intersection of the plurality of incident light beams with the substrate. The light detecting arrangement 32 generally includes individual light detectors 42 that correspond to each of the second light beams 40. Furthermore, each of the detectors 42 is arranged for detecting the light intensity and for generating signals based on the detected light.”

Also in context with Fig. 1, the original disclosure states on page 10, lines 13-15, “As should be appreciated, the optical inspection system 10 can be arranged to perform several types of inspection, for example, transmitted light inspection, reflected light inspection and simultaneous reflected and transmitted inspection.” And on page 11, lines 1-7, “For example, in simultaneous reflected and transmitted inspection, a comparison is made between the light that is reflected off the surface of the substrate and light that is transmitted through the substrate. In this type of inspection the optical inspection system performs all of the inspection tasks using only the substrate to be inspected.”

Based on the above disclosure, the objection and rejection should be withdrawn.

ISSUES UNDER 35 USC 102(b)

Claims 1-4, 6-7, 9, 20, 23, 33, 41, 42 and 46 have been rejected under 35 U.S.C. §102(b) as being anticipated by *Karaki* et al (5,130,965).

Claims 1-4, 6-7, 9, 20, 23, 33, 41, and 46 have been rejected under 35 U.S.C. §102(b) as being anticipated by *Shikichi* et al (5,151,888).

While transmitted light may be understood as light transmitted through the first surface of a medium and reflected from a second surface of a medium in Fig. 1 of *Karaki* or Fig. 4 of

Shikichi, it is not defined that way in the specification of the present invention. Transmitted light in the present application is that light that is passed through the substrate under inspection. By way of example, see Fig. 2, which shows transmitted light 94 that has passed through the substrate. In addition, it is stated on page 13, lines 11-12, "The transmitted light beams 94A, 94B, and 94C pass through the substrate 12." In accordance with this, it is believed that the term "transmitted light" distinguishes the claim from *Karaki* and *Shikichi*. However, in order to expedite the prosecution of this case in lieu of the Examiner's rejection to this matter, the rejected claim 1 (as well as claim 25) has been amended to include language stating that the transmitted light is that light which passes through the substrate. The Examiner is respectfully requested to implement these amendments even though we are after final since this was what was meant by "transmitted light" all along.

Therefore, in contrast to *Karaki* and *Shikichi*, independent claim 1 (and its dependents) specifically requires, "...a light detector arrangement including individual light detectors that correspond to individual ones of a plurality of transmitted light beams caused by the intersection of the plurality of light beams with the surface of the substrate and by passing the plurality of light beams through the substrate..." Neither reference teaches transmitted light that passes through the substrate, thus the rejection is unsupported by the art and should be withdrawn.

Also in contrast to *Karaki*, dependent claim 3 specifically requires, "...each of the plurality of light beams has about the same light intensity." *Karaki* teaches away from this when it is stated, "...the first beam B1 for recording has a strong light intensity while the second beam B2 and the third beam B3 have a lower light intensity than the first beam B1, thus having no effect on recording (Col. 4, lines 46-49)." Accordingly, the rejection is unsupported by the art and should be withdrawn. It appears that *Shikichi* is silent on this issue, however, it is believed that the beams in *Shikichi* are similar to those in *Karaki* (1 recording beam, 2 tracking beams), i.e., the intensity of the tracking beams would be less than the recording beams to ensure proper recording.

The rejection to claim dependent 4 should be withdrawn for the same reason given for claim 3.

Also in contrast to *Karaki* and *Shikichi*, dependent claim 9 specifically requires, "the first set of optical elements comprises a beam deflector disposed along the first optical axis, the beam

deflector being arranged for deflecting the light beam such that the scanning spots are caused to sweep across the surface of the substrate in substantially one direction from a first point to a second point.” As should be appreciated, the beams in *Karaki* and *Shikichi* are configured to follow tracks for the reason of recording on the track. If the beams were deflected as required in claim 9, then the recording or reproduction would not take place since the beams would not follow the track, i.e., they would be off track. Accordingly, the rejection is unsupported by the art and should be withdrawn.

Also in contrast to *Karaki* and *Shikichi*, independent claim 23 specifically requires, “each of the scanning spots having a specified overlap and separation with respect to one another that is controlled by the grating spacing and the rotation of the diffraction grating about the optical axis.” While *Karaki* and *Shikichi* may disclose a light spot configuration (as shown in Fig. 2 of *Karaki* and Fig. 4 of *Shikichi*), neither reference teaches or suggests a light spot configuration that is controlled by multiple elements (e.g., grating spacing and rotation). It appears *Shikichi* is completely silent to any type of diffraction grating control. In *Karaki*, the position of the light spots are switched by rotating the diffraction grid. No mention is made to controlling the position of the light spots via the grating spacing. Therefore, the rejection is unsupported by the art and should be withdrawn.

Also in contrast to *Karaki* and *Shikichi*, independent claim 41 (which was amended to include the limitations of dependent claims 42, 43 and 46) specifically requires, “...a telescope for varying the size of the scanning spots on the surface of the substrate...” Neither reference teaches or suggests a telescope, and more particularly, an element for varying the size of the scanning spots on the surface of the substrate and therefore the rejection is unsupported by the art and should be withdrawn.

Claims 1-17, 20, 30, 41-42 and 46 have been rejected under 35 U.S.C. §102(e) as being anticipated by *Vaez-Iravani* (6,208,411).

In contrast to *Vaez-Iravani*, independent claim 1 (and its dependents) specifically requires, “...a light detector arrangement including individual light detectors that correspond to individual ones of a plurality of transmitted light beams caused by the intersection of the plurality of light beams with the surface of the substrate and by passing the plurality of light

beams through the substrate...” *Vaez-Iravani* does not teach transmitted light that passes through the substrate, thus the rejection is unsupported by the art and should be withdrawn.

Also in contrast to *Vaez-Iravani*, independent claim 41 (which was amended to include the limitation of claims 42, 43 and 46) specifically requires, “...the second optical arrangement including a prism for directing individual ones of the plurality of reflected or transmitted beams to individual light detectors...” *Vaez-Iravani* appears to be silent about prisms for directing individual ones of the plurality of reflected or transmitted beams to individual light detectors and therefore the rejection is unsupported by the art and should be withdrawn.

ISSUES UNDER 35 USC 103(a)

Claims 18, 19, 21 and 23 have been rejected under 35 U.S.C. §103(a) as being unpatentable over *Vaez-Iravani* (6,208,411).

With regards to claims 18, 19 and 21, these claims are dependents of claim 1 and therefore should be withdrawn for at least the reasons given above.

Furthermore, it is respectfully submitted that the rejection is believed to be improper since the prior art reference *Vaez-Iravani* is disqualified as prior art against the claimed invention. MPEP 706.02(k) states, “Effective November 29, 1999, subject matter which was prior art under former 35 USC 103 via 35 USC 102(e) is now disqualified as prior art against the claimed invention if that subject matter and the claimed invention ‘were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.’” With regards to these issues, *Vaez-Iravani* was filed on September 28, 1998 and issued on March 27, 2001, and the present application was filed on August 10, 2000. Further, the present application was filed after November 29, 1999, and *Vaez-Iravani* and the claimed invention were, at the time the invention was made, owned by or subject to an obligation of assignment to KLA-Tencor Corporation, San Jose, CA (US). Accordingly, the 103 rejection should be withdrawn.

Although the *Vaez-Iravani* reference is disqualified as prior art against the claimed invention, it should be noted that the claimed invention is still believed to be patentably distinguishable therefrom.

Claims 1-46 have been rejected under 35 U.S.C. §103(a) as being unpatentable over *Sanada et al* (6,084,716) in view of *Vaez-Iravani* or *Shikichi et al* or *Karaki et al*.

Sanada and Vaez-Iravani

As stated above, the *Vaez-Iravani* reference is disqualified as prior art against the claimed invention. It should be noted, however, that the claimed invention is still believed to be patentably distinguishable from the cited combination.

Sanada and Shikichi or Karaki

In the last amendment, the undersigned respectfully disagreed with the Examiners addition of *Shikichi* or *Karaki* to *Sanada* in that there must be a basis in the art for combining or modifying references. In the outstanding office action, the Examiner asserted that the rationale for the modification would have arisen from the fact that all of the references are relative to an inspection device. The undersigned respectfully traverses this rationale in that *Karaki* and *Shikichi* do not describe inspection devices that are relative to the inspection device described in *Sanada*. Relative implies that there is some relationship. This is not the case since *Karaki* and *Shikichi* are isolated teachings that fall outside the scope of the invention disclosed in *Sanada*. In fact, one could argue that *Karaki* and *Shikichi* do not teach inspection devices at all, but rather recording and reproducing devices that have detection elements that ensure a compact disc or optical card are properly recorded or reproduced. In contrast, *Sanada* discloses an optical substrate inspection apparatus that is dedicated to inspecting masks or wafers having patterns requisite for fabricating semiconductor devices. In particular, inspecting defects of a pattern and/or foreign material adhering thereto. Accordingly, the rejection is improper and should be withdrawn. It should be noted that, the Federal Circuit has repeatedly warned against using the applicant's disclosure as a blueprint to reconstruct the claimed invention out of isolated teachings in the prior art.

Even if there is a basis for combining the references, the references are not properly combinable if their intended function is destroyed. As mentioned in the previous amendment, the intended function of *Shikichi* or *Karaki* would be destroyed by combining it with *Sanada*. As should be appreciated, the CCPA and the Federal Circuit have consistently held that when a

103 rejection is based upon a modification of a reference that destroys the intent, purpose or function of the invention disclosed in the reference, such a proposed modification is not proper and the prima facie case of obviousness can not be properly made.

With regards to claim 1 and 25 (and their dependents), the combination of *Shikichi* to *Sanada* destroys the function of the invention disclosed in *Shikichi*. In particular, *Shikichi* would not function as intended by using transmitted light (that has passed through the substrate). *Shikichi* uses reflectance to detect tracks of information. If light was transmitted through the optical card then the intended function of detecting information via reflectance would be destroyed. To further this point, the optical card includes a recording layer having tracks, which contain recorded information that is optically detected via their reflectance. In order to use transmitted light, the recording layer would have to have transparent portions, which would adversely effect the tracking of tracks, the recording of pit rows, reproducing of pit rows and the like (see Col. 2, lines 33-43). *Karaki* has similar problems as *Shikichi*. *Karaki* is directed towards compact discs that include a reflective surface for reading information therefrom. If the reflective surface had transparent portions then the information on the compact disc would not be able to be read. For example, the tracking beams would not be able to follow the track and thus the recording and reproducing beam would be lost. Accordingly, the rejection is improper and should be withdrawn.

With regards to claim 22 (and its dependents), the combination of *Shikichi* to *Sanada* destroys the function of the invention disclosed in *Shikichi*. In particular, *Shikichi* would not function as intended by sweeping a plurality of beams. In *Shikichi*, at least some of the beams are used for maintaining the position of the beams along a track as the optical card is moved (e.g. tracking). If the tracking beams were swept, then their intended function of maintaining a position along the track would be destroyed. *Karaki* has the same problems (e.g., tracking beams).

Furthermore, it is believed that *Karaki* and *Shikichi* are nonanalogous art. Analogous art, according to the CCPA and Federal Circuit cases, is all art that is either 1) in the field of technology of the claimed invention or 2) deals with the same problem solved by the claimed invention even though outside the field of technology of the invention. With regards to the first issue (1), Both *Karaki* and *Shikichi* are directed at optical recording and reproducing apparatus. In particular, *Karaki* is directed at recording and reproducing of compact discs, and *Shikichi* is

directed at recording and reproducing optical cards. In contrast, the present invention is directed at a system for detecting defects in reticles, masks or semiconductor wafers. While the technologies may be based in optics, it should be appreciated that recording and reproducing compact discs is a much different field than characterizing defects in reticles, masks or semiconductor wafers. With regards to the second issue (2), *Karaki* is directed at improving the quality of prior to recording and after recording monitoring signals without newly providing a complicated optical system, and *Shikichi* is directed at overcoming problems related to tracking, i.e., when the recording or reproducing beam deviates from the recording area. In contrast, the present invention is directed at improving the sensitivity and scanning speeds of an inspection system. Accordingly, the rejection is believed to be improper and thus the rejection should be withdrawn.

In any event, the claimed invention is still believed to be patentably distinguishable from the cited combinations. For example, none of the references teach or suggest, "each of the scanning spots having a specified overlap and separation with respect to one another that is controlled by the grating spacing and the rotation of the diffraction grating about the optical axis," as required by claim 23. *Sanada* is completely silent to diffraction gratings. *Shikichi* is completely silent to any type of diffraction grating control. In *Karaki*, the position of the light spots are switched by rotating the diffraction grid. No mention is made to controlling the position of the light spots via the grating spacing. Therefore, the rejection is unsupported by the art and should be withdrawn.

Furthermore, with regards to claim 41, none of the references teach or suggest, "a telescope for varying the size of the scanning spots on the surface of the substrate," or "a prism for directing individual ones of the plurality of reflected or transmitted beams to individual light detectors" as required by claim 23. The Examiner is respectfully urged to make a showing of these features in the prior art in order to maintain the rejection.

DOUBLE PATENTING

Claims 1-46 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1-20 of copending Application No. 09/636,129.

Once the conflicting claims have become patented, the Applicant will consider filing a terminal disclaimer in accordance with 37 CFR 1.321(c).

SUMMARY

Applicant believes that all pending claims are allowable and respectfully requests a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

Respectfully submitted,

BEYER WEAVER & THOMAS, LLP

A handwritten signature in black ink, appearing to read 'Q. Hoellwarth', with a long horizontal flourish extending to the right.

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APPENDIX

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1. (Twice Amended) An optical inspection system for inspecting the surface of a substrate, comprising:

a light source for emitting an incident light beam along an optical axis;

a first set of optical elements arranged for separating the incident light beam into a plurality of light beams, directing the plurality of light beams to intersect with the surface of the substrate, focusing the plurality of light beams to a plurality of scanning spots on the surface of the substrate; and

a light detector arrangement including individual light detectors that correspond to individual ones of a plurality of transmitted light beams caused by the intersection of the plurality of light beams with the surface of the substrate **and by passing the plurality of light beams through the substrate,** the light detectors being arranged for sensing the light intensity of the transmitted light.

25. (Once Amended) An optical inspection system for inspecting the surface of a substrate, comprising:

a light source for emitting an incident light beam along an optical axis;

a first set of optical elements arranged for separating the incident light beam into a plurality of light beams, directing the plurality of light beams to intersect with the surface of the substrate, focusing the plurality of light beams to a plurality of scanning spots on the surface of the substrate; and

a light detector arrangement including individual light detectors that correspond to individual ones of a plurality of reflected and transmitted light beams caused by the intersection of the plurality of light beams with the surface of the substrate, **the transmitted beams being formed by passing the plurality of light beams through the substrate,** the light detectors being arranged for sensing the light intensity of the reflected and transmitted light.

41. (Once Amended) An optical inspection system for inspecting a substrate, comprising:

a light source for emitting a light beam;

a first optical arrangement for separating the light beam into a plurality of spatially distinct light beams, **the first optical arrangement including a diffraction grating or a beam splitter cube;**

an objective lens for focusing the plurality of light beams to a plurality of scanning spots on the surface of the substrate and a telescope for varying the size of the scanning spots on the surface of the substrate;

a second optical arrangement for collecting either a plurality of reflected light beams or a plurality of transmitted light beams caused by the intersection of the plurality of light beams with the surface of the substrate, **the second optical arrangement including a prism for directing individual ones of the plurality of reflected or transmitted beams to individual light detectors;** and

a light detector arrangement including individual light detectors that correspond to individual ones of the plurality of reflected or transmitted light beams, the light detectors being arranged for sensing the light intensity of either the reflected or transmitted light.

44. (Once Amended) The system as recited in claim [43] **41** wherein the prism includes a facet for each one of the individual reflected or transmitted beams.

45. (Once Amended) The system as recited in claim [43] **41** wherein the second optical arrangement further includes a first lens for collecting the plurality of reflected or transmitted beams and a spherical aberration lens for directing the collected plurality of reflected or transmitted beams to the prism.